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VA's new water tunnel begins operations

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WRIGHT-PATTERSON AIR FORCE BASE, Ohio — The Air Force Research Laboratory's Air Vehicles new horizontal free-surface water tunnel entered nominal operational status on March 7, and concluded its first complete experiment on April 18.

The test was performed on a re-entry vehicle with a new cropped delta wing designed and used dye injections to gain better visualizations of flowfields around the vehicle.

The water tunnel facility was envisioned as the first new facility under the auspices of the Consolidated Aeronautical Sciences Laboratory, which supports greater interaction between Computational Fluid Dynamics and Experimental Fluid Dynamics (EFD).

Originally built as part of a project to support Micro Air Vehicle aerodynamics research, the tunnel will be used in several upcoming experiments investigating leading edge vortex capturing, low-Reynolds number airfoil performance and unsteady separation. The water tunnel facility is also available for flow visualization and eventually particle image velocimetry measurements on a wide range of component aerodynamics and basic research topics.

Although the Air Force has been using water tunnels for aerospace applications since the 1960s, they are steadily gaining popularity as a better alternative to small, low-speed wind tunnels. The use of dye streams provides enhanced visualizations for discerning flow patterns, yet is simple to use and cost very little. In addition, instead of having the water flow over a stationary test object, the object can be towed through the water, which is useful in experiments in impulsive starts, or where turbulence must be kept to a minimum. @